



Research and Development Technical Report
CECOM-TR-96-5

SOME NEW APPROACHES TO "REWARD" CONTRACTING.

WILLIAM N. WASHINGTON
COST ANALYSIS DIVISION

MAY 1996

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION IS UNLIMITED

19960613 009

CECOM
U.S. ARMY COMMUNICATIONS-ELECTRONICS COMMAND
DIRECTORATE FOR RESOURCE MANAGEMENT
FORT MONMOUTH, NEW JERSEY 07703-5034

Approved for public release; distribution is unlimited.

NOTICES

Disclaimers

The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

The citation of trade names and names of manufacturers in this report is not to be construed as official Government endorsement or approval of commercial products or services referenced herein.

REPORT DOCUMENTATION PAGE			Form Approved OMB NO. 0704-0188
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comment regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</p>			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE May 1996	3. REPORT TYPE AND DATES COVERED Technical Report	
4. TITLE AND SUBTITLE SOME NEW APPROACHES TO "REWARD" CONTRACTING		5. FUNDING NUMBERS	
6. AUTHOR(S) William N. Washington			
7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES) US Army Communications-Electronics Command (CECOM) Directorate for Resource Management Cost Analysis Division, ATTN: AMSEL-CP-CA Fort Monmouth, NJ 07703-5034		8. PERFORMING ORGANIZATION REPORT NUMBER CECOM-TR-96-5	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12 b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report addresses some suggestions made by Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology, and Colleen Preston, Deputy Under Secretary of Defense for Acquisition Reform, concerning incentivizing change away from the one-size-fits-all mode of contracting, and providing more information to the source selection authority for cost tradeoffs. Three types of award contracts are discussed (i.e., Incentive, Award Fee, and Research Tournaments), and suggestions are made on what might be done to improve them. A new approach called "Research Tournaments" is presented, which seems to have merit in providing more contract vehicles for consideration in the contracting process.			
14. SUBJECT TERMS Weapon system acquisition; contracting; Government procurement; military procurement; competition; research tournaments; incentive fee; award fee		15. NUMBER OF PAGES 13	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OR REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

Contents

Executive Summary	v
Introduction	1
History of “Reward” Contracting	1
Incentive Contracting	1
Award Fee Contracting	2
Research Tournaments	3
Summary	5
References	6

Executive Summary

This report addresses some suggestions made by Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology, and Colleen Preston, Deputy Under Secretary of Defense for Acquisition Reform, concerning incentivizing change away from the one-size-fits-all mode of contracting, and providing more information to the source selection authority for cost tradeoffs.

Three types of "Reward" contracts (i.e., Incentive, Award Fee, and Research Tournaments) are discussed, and suggestions on what might be done to improve them are made. To provide more contract vehicles for consideration in the contracting process, the report presents a new approach called "Research Tournaments" which seems to have merit.

Introduction

In January of 1995, Dr. Paul Kaminski (1995), Under Secretary of Defense for Acquisition and Technology, discussed at the Industrial College of the Armed Forces his concepts on the challenges to be faced with decreasing defense budgets, and the need to reduce the cost of weapon system procurements. In this presentation he pointed out the need to adopt a more balanced approach to the cost-performance relationships in our procurements, stressing the need to do up-front tradeoffs, and assessments of the incremental cost requirements. He stated that the results of these analyses should be made available to the decision makers early in the source selection process, so they could take them into consideration. He also mentioned the need to incentivize change away from the one-size-fits-all mode that we have followed in the past. Colleen Preston (1995), Deputy Under Secretary of Defense for Acquisition Reform, also stressed these points in her testimony before the House Government Reform and Oversight Committee.

This report will strive to look at some of the new ideas on competition, and how some of the older ones might be modified to improve their usability. Specifically, it will deal with different contract vehicles for rewarding a contractor's performance enhancement, cost savings, or schedule savings that exceed the minimum requirements specified by the Government. This is in keeping with the new DoD Directive 5000.2-R (1996), which stresses Cost Management Incentives. The purpose behind "reward" contracting is to offer an inducement to the contractors to go beyond business-as-usual development programs, and attempt to produce innovative processes or products that subsequently benefit the Government (Rogerson (1989)). This is based upon the premise that if the reward to the manufacturer is low, quality manufacturers will not be interested in doing business with the Government. For instance, if profits are limited to 10 percent of the contract award, only contractors who normally make less or equal to that in the private sector will be willing to bid on the contract; and contractors who normally make more will not be willing to bid, and subsequently lose money by accepting those contracts (Lucas (1996)). This is evidenced by several contractors recently selling their Government divisions, so they can focus on the more lucrative commercial market (Beltramo (1996)). In support of the reward premise, recent industry comments have suggested that the Government should share some of its savings with industry, when industry has made an investment which produced savings for the Government (National Defense (1996)).

History of "Reward" Contracting

Incentive Contracting - Under this type of contract, the incentive payment varies based upon the contractor's ability to satisfy specific formula-driven cost and/or performance objectives; where a precise definition of the factors that will be used to determine the incentive fee to be paid is negotiated in advance, and allows some of the profit loss or gain to be shared between the Government and the contractor, based on the contractor's ability to reach the target goal. The objective of an incentive contract is to motivate the contractor to earn more compensation by achieving better performance and/or controlling costs.

Problems with Incentive Contracting

These contracts have not been found to be especially effective in reducing costs, nor speeding up schedule, but they do generally meet performance goals, according to DeMong (1984) who reviewed several previous studies (Belden (1969); DeMong (1978); Hunt (1971); Hunt, Rubin and Perry (1971); Jameson (1979); and Williams and Carr (1981)). GAO (1987) performed a review of sixty-two DoD Incentive Contracts to determine if this type of contracting met the theory concepts it was supposed to follow. Their findings were consistent with the theory that the final costs for the programs would fall around the target price set at contract award (the majority of the contracts fell within 5 percent of the target), with 47 percent of the contracts falling under the target and 53 percent falling over the target price. However, 21 percent of the contracts exceeded the ceiling price where the Government liability ended. They also found that there was no relationship between the cost-sharing ratio and the achievement of a contract's target price, which runs against the theory that as a contractor's share ratio increases, the contractor has a greater incentive to meet or underrun the target costs.

Award Fee Contracting - In these types of contracts, the Government lays out its priorities as to what kinds of things it considers important, and will pay an award fee for. These types of contracts have been in use since 1962, when the National Aeronautics and Space Administration and the Navy started to use them. Its purpose is to encourage the contractor to surpass the minimum acceptable level of performance established in the contract, for areas ranging from cost to schedule to performance. This type of contract varies from the Incentive Contract, in that the award is subjective and based upon after-the-fact evaluations to determine the amount of the award. The award fee contracts have generally been found to be effective in improving contractor performance, according to Beeckler and Correia (1982), and DeMong (1984) who reviewed a number of previous studies (Brown (1976); Buck (1974); Byers (1973); Carter (1977); DeJong (1978); Egan (1968); Hunt (1982); Knepshield (1976); Larsen (1978); and Williams and Carr (1981)). Several authors attribute the success of this type of contract over Incentive Contracts to the involvement and periodic performance evaluations performed on the contracts (Jameson (1979); and Keathley (1994)). Originally, this type of contract was limited to Cost Plus Contracts, however Francom (1989) recommended that they should be expanded to include Fixed Price Contracts, which they currently have been.

Problems with Award Fee Contracting

This type of contract requires significant technical and managerial oversight to continually monitor and communicate with the contractor as to their work effort, since the awards are made as often as the Government wants throughout the contract's life (DeMong (1984); Hogenmiller (1992); and Schade (1990)). There may also be a problem with the determination of the contractor's performance, due to the subjective nature of the decision process as to whether and how much the Award Fee should constitute (GAO Study (1991); and Isbell (1992)). This GAO review of the Department of Energy Award Contracts (1991) recommended three areas that needed improvement in this type of contract. The first was that there was a need to develop specific, measurable performance

objectives over what had been used previously. Second, there was a need to develop procedures that appropriately reflected the results of the on-site reviews in the performance evaluations, and that tracked the contractor's responses to previously identified deficiencies. Lastly, they recommended new procedures and training to implement these recommendations. In summary, the GAO report stated that to achieve these new procedures, more time would have to be spent on the day-to-day operations and procedures, and that this could possibly require more staff to review the processes. Isbell (1992) also discussed some NASA recommendations, whereby these contracts should have a negative or zero fee, if the contractor's performance were not up to expectations.

Suggestions

Perhaps one way to lessen the amount of Government oversight, and reduce its costs in time and manpower, would be to use a predefined range consisting of three levels (e.g., moderate, substantial, and significant improvement), where each level would explicitly define a level of achievement, and its associated Award Fee. This would reduce the arbitrary nature of the award process, and also the time spent by Government personnel in trying to determine if an award were merited, and the amount of award that should be given. This would be in keeping with the GAO recommendations above, but would not be as specific as an Incentive Award Contract, thereby keeping some of the flexibility for motivation in the Award Fee contract.

Another way that this problem might be addressed would be for the contractor to specify in his proposal what he would consider to be appropriate rewards for specific goals (Fullerton (1995a)). This would allow the source selection committee to perform the up-front tradeoffs and assessments of the incremental cost requirements that Dr. Kaminski (1995) has suggested. It would also reduce the arbitrary nature of what constitutes an improvement, and make the award equal to what the contractor feels it should be worth. This simple process would eliminate most of the problems associated with Award Fee Contracts, and also save time and effort on the part of the Government.

Research Tournaments - Recently, Fullerton (1995a and 1995b); Fullerton and McAfee (1996), and Taylor (1995) have expressed some novel and interesting proposals concerning competition. These are termed "Research Tournaments," in which the competition procedure is structured as an auction and prototype competition, with the winner awarded a "prize" for the best product. The auction component consists of the participants paying a fee for entering the tournament, which could be used to defray the cost of the prize, or offset the cost of conducting the competition.

The process would be for the Government to commit to pay the research tournament winner a prize that would be verifiable by the courts (i.e., a prize that would be required to be awarded). The selection of the winner would be based upon specified priorities (e.g., performance and/or cost) established by the Government, which would be specified in the request for proposal, so that the competing firms would know which innovations/priorities were

most important in winning the prize. Finally, each firm would submit its prototype at the end of a specified period of time, for the Government to evaluate and subsequently award the prize for the best product. Thus, the competition would differ from a patent competition, in that it would not be the first to patent a design, but rather the most innovative design across a group of offerors that would win. Thus the quality of the design is stressed over the date of discovery. This process should promote innovation on the part of the offerors, and provide firmer cost estimates for equipments, since costs would be based upon completed hardware versus conceptual hardware estimates. Rich and Janos (1994) also point out "the beauty of a prototype is that it can be evaluated, and its uses clarified, before costly investments for large numbers are made." This is also in keeping with the new DoD Directive 5000.1 (1996), which stresses modeling and simulation of new systems. An additional benefit of this type of procurement is that it should require less Government oversight (since the offeror has already developed the item, and is offering it at a fixed price to the Government, concern about overseeing development and production costs is negated). Lastly, as mentioned above, the contractors could specify along with their proposals what they consider to be appropriate rewards/fees for additional or alternative performance goals. This would allow the source selection authority to perform up-front tradeoffs and assessments.

This type of contract would seem most suited for procurements that have either spin-on or spin-off possibilities, where there are opportunities that the developed product would have potential for commercial applications, since this would prompt the developer to risk capital investments in the hope of significant commercial gains. The concept behind this type of procurement is not new, with the first instance of its use in the development of the steam locomotive in England in 1829 (Day (1971)): where £500 pounds were awarded for the "fastest" steam locomotive to meet the railroad's requirements. In this contest five offerors entered, but three of the locomotives did not meet the requirements stated by the railroad, so competitive races were run between the remaining two locomotives, the "Rocket" and the "Novelty." The Rocket was the eventual winner, with the Novelty breaking down on one of the competitive trial runs. This example demonstrates one of the advantages of a prototype competition, in that the demos can be tested in a face-off, which would surface design problems that may not be obvious in just reviewing the design drawings. More recently, the selection of the High Definition TV Standards (The Economist (1993)), and the Air Force's Advanced Tactical Fighter Plane (Easterbrook (1991) and Opall (1991)) were based upon prototype competitions. Opall (1991) points out that while the contractors were not happy with investing so much money up-front on a program, they do expect to recover their investments with a profit on the system within 10 years, and viewed that the technologies they developed as part of their effort would give them a leg up on other contracts in the future.

One of the difficulties of a prize process is determining what the amount of the prize should be. One approach would be to set the award to a commensurate level of what the Government felt the work effort to be worth; but, like the Award Fee, would have problems with its arbitrary nature. Another approach has been suggested by Rogerson (1989), which would involve basing the prize on a formula which uses the price of a company's stock. In that way, the prize could vary from one company to another, but it would still have the same magnitude of importance to the offeror. This approach would allow for computing the prize in advance, so the

source selection authority could utilize that information in their determination. Fullerton (1995a) has suggested that the contractor specify in his proposal what he would consider to be an appropriate reward for his efforts, and that amount, like Rogerson's, could be taken into consideration in the source selection. Or, if the contract award was large enough, or had commercial applications, the award could constitute just the winning of the contract, since the follow-on work would generate sufficient commercial incentives for the company. With these various alternative approaches to determine the nature of the award, it would depend upon the type of procurement as to which method would be more appropriate.

Summary

This report looks at three types of "Reward" contracts that can be used to incentivize contractors to either enhance performance, reduce costs, or lessen development and/or production time over the minimum requirements stated by the Government. In reviewing these contract vehicles, their limitations are discussed and suggestions on how they might be modified are made. A new contracting type termed "Research Tournaments" is discussed, which seems to have merits for specific goals in some procurement areas. In keeping with Dr. Kaminski's recommendations concerning incentivizing change away from the one-size-fits-all mode of contracting, these contract vehicles should be viewed as possible different approaches that can be used to bring benefits to the modernization of Government equipments. The specific type of reward contract to use to achieve these benefits would seem to be dependent upon the type of benefit desired, the amount of Government oversight available, and the amount of risk placed upon the contractor.

References:

- Beeckler, C. E. and Correia, Charles A. (1982), Award Fee Influence on DTUPC, Report, US Army Procurement Research Office, Fort Lee, VA.
- Belden, David L. (1969), Defense Procurement Outcomes in the Incentive Contract Environment, Doctoral Dissertation, Stanford University.
- Beltramo, Michael N. (1996), Acquisition Reform: This Time We Really Mean It, Paper presented at the 29th Department of Defense Cost Analysis Symposium, Leesberg, VA, February 21-23.
- Brown, Jerry V. (1976), The Award Fee Incentive: Management Considerations Regarding Its Applications to Research and Development Contracts, Report, Defense Systems Management College.
- Buck, John T. (1974), Reward Fee Provisions in Defense Contracting, Report, Air War College.
- Byers, Mel D. (1973), A Study of the Relationship between Contractor Performance and the Magnitude of the Award Fee in Cost Plus Award Fee Contracts, Master's Thesis, Air Force Institute of Technology.
- Carter, Shirley H. (1977), Effectiveness of Award Fee Provisions in DARCOM Contracts, Report, Army Procurement Research Office, Fort Lee, VA.
- Day, John R. (1971), Trains, Bantam Books.
- DeJong, Robert V. (1978), The Effectiveness of the Cost-Plus-Award-Fee Contract as Used for Ammunition Procurement in Government Owned Contractor Operated Plants, Report, US Army Logistics Management Center, Florida Institute of Technology.
- DeMong, Richard F. (1978), The Effectiveness of Incentive Contracts: What Research Tells Us, *National Contract Quarterly Journal*, Vol. 12, pp. 12-22.
- DeMong, Richard F. (1984), Award Fee Contract Provisions as a Program Management Tool, University of Virginia, DTIC # ADP002776.
- DoD Directive 5000.1 (1996), Defense Acquisition, March 15, p. 6.
- DoD Directive 5000.2-R (1996), Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs, March 15, pp. 7-8 part 3.
- Easterbrook, Gregg (1991), The Real Lesson of the B-2, *Newsweek*, November 11, pp. 50-51.
- Egan, Douglas M. (1968), Experimentation in Government Procurement, *Journal of Purchasing*, Vol. 4, pp. 14-28.
- Francom, Gerald L. (1989), A Proposal to change the Federal Acquisition Regulation: Recognizing the Award Fee Incentive in Fixed-Price Contracts, Master's Thesis, Naval Postgraduate School, Monterey, CA.
- Fullerton, Richard L. (1995a), Tournaments and Competition in Defense Acquisition Reform, Doctoral Dissertation, University of Texas, Austin, TX, March 17.
- Fullerton, Richard L. (1995b), Using Auctions to Reward Research Tournament Winners, Draft paper, September.
- Fullerton, Richard L. and McAfee, R. Preston (1996), Auctioning Entry into Tournaments, Draft paper, January 17.
- GAO Study (1987), Incentive Contracts, Examination of Fixed-Price Incentive Contracts, U.S. Dept. of Commerce, National Technical Information Service, GAO/NSIAD-88- 36BR.

- GAO Study (1991), Energy Management: Tightening Fee Process and Contractor Accountability Will Challenge DOE, US General Accounting Office, Washington, DC, DTIC # ADA292040.
- Hogenmiller, Mark E. (1992), Utilization of Award Fee Contracts at Navy Regional Contracting Centers, Master's Thesis, Naval Postgraduate School, Monterey, CA.
- Hunt, Raymond G. (1971), Extra-Contractual Influences in Government Contracting, Report State University of New York, Buffalo.
- Hunt, Raymond G., Rubin, Ira S. and Perry, Franklin A. (1971), The Use of Incentives in R&D Contracting: A Critical Evaluation of Theory and Method, Report, State University of New York, Buffalo.
- Hunt, Raymond G. (1982), Concepts of Federal Procurement: The Award Fee Approach, *Defense Management Journal*, Vol. 18, pp. 8-17.
- Isbell, Douglas (1992), Firms Push Procurement Reform, *Space News*, March 22.
- Jameson, Thomas L. (1979), A Reassessment of Incentive Contracting and Contracting Motivational Forces other than Profit, Report, US Army Logistics Management Center, Florida Institute of Technology.
- Kaminski, Paul G. (1995), Acquisition Challenge: Affordable Technological Supremacy, Presentation at the Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, DC, January 27.
- Keathley, William C. (1994), The Advantages of Cost Plus Award Fee Contracts, Readings in Program Control, National Aeronautics and Space Administration, Washington, DC, December.
- Knepshield, James R. (1976), Utilization of Performance Incentives in Production Contracting, Report, Defense Systems Management College.
- Larsen, James A. (1978), An Analysis of the Effectiveness of Cost Plus Award Fee Contracts in Motivating Government Owned Contractor Operated Contractors, Master's Thesis, Florida Institute of Technology.
- Lucas, R.H. (1996), Business as Usual versus New Acquisition Paradigm, Paper presented at the 29th Department of Defense Cost Analysis Symposium, Leesberg, VA, February 21-23.
- National Defense (1996), Defense Industry Executive Outlines Actions for Preserving Viable Base, April, p. 15.
- Opall, Barbara (1991), F-22 Subcontractors See Little Chance of Recouping Cost, *Defense News*, August 5, pp. 3 and 45.
- Preston, Colleen (1995), DoD Must Re-engineer its Procurement System Now, House Government Reform and Oversight Committee testimony, February 21.
- Rich, Ben and Janos, Leo (1994), Skunk Works. Little, Brown and Company.
- Rogerson, William P. (1989), Profit Regulation of Defense Contractors and Prizes for Innovation, *Journal of Political Economy*, Vol. 97, #6, pp. 1284-1305.
- Schade, Don P. (1990), Fixed Price Award Fee: An Economic Motivational and Contracting Theory Analysis, Master's Thesis, Naval Postgraduate School, Monterey, CA.
- Taylor, Curtis (1995), Digging for Golden Carrots: An Analysis of Research Tournaments, *American Economic Review*, September.
- The Economist (1993), HDTV All Together Now, May 29, p. 74.
- Williams, Robert F. and Carr, Daniel M. (1981), Contractor Motivation: Theory and Application, Report, US Army Procurement Research Office.

Distribution List

Defense Technical Information Center
ATTN: DTIC-OCC
8725 Kingman Rd., Ste 0944
Ft. Belvoir, VA 22060-6218

Director
US Army Material Systems Analysis Actv
ATTN: DRXSY-MP
Aberdeen Proving Ground, MD 21005

Director, US Army CECOM
Research, Development and Eng. Center
ATTN: AMSEL-RD
Fort Monmouth, NJ 07703-5000

Director, US Army CECOM
Command, Control, Communications,
Computers, Intelligence, Electronics
Warfare Acquisition Center
ATTN: AMSEL-AC
Fort Monmouth, NJ 07703-5000

Director, US Army CECOM
Directorate for Resource Management
ATTN: AMSEL-CP
Fort Monmouth, NJ 07703-5000

CECOM, R&D Technical Library
Fort Monmouth, NJ 07703-5703
(1) AMSEL-IM-BM-I-L-R (Tech Library)
(3) AMSEL-IM-BM-I-L-R (STINFO Ofc)

Mr. Robert W. Young
Dir., USACEAC
5611 Columbia Pike
Falls Church, VA 22041-5050

Mr. Bernard Rudwick
Financial Management Department
Defense Systems Management College
Fort Belvoir, VA 22060

Dr. David R. Whipple
Dept. of Administrative Sciences
Naval Postgraduate School
Monterey, CA 93943-5000

Dr. Roland D. Kankey
Graduate School of Logistics and
Acquisition Management
Air Force Institute of Technology
Department of Acquisition Management
AFIT/LAS
2950 P Street (Bldg. 641)
Wright-Patterson AFB, OH 45433-7765

Ms. Carolyn S. Thompson
Program Analysis and Integration Dir.
US Army Space and Strategic Defense
Command
Box 1500
Huntsville, AL 35807-3801

Mr. John Smuck
Naval Center for Cost Analysis
Suite 400, West Tower
1111 Jefferson Davis Hwy.
Arlington, VA 22202-4306

Ms. Noreen Bryan
Naval Air Systems Command
Cost Department (AIR-4.2)
1421 Jefferson Davis Hwy.
Arlington, VA 22243-5240

Ms. Donna J. Vogel
Cost Division
Directorate of Financial Management and
Comptroller
Air Force Materiel Command
ASC/FMC, Bldg. 11A
1970 Third St., Suite 6
Wright-Patterson AFB, OH 45433-7213